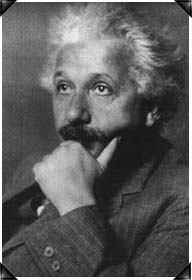
**Let There Be Light!**

Name:

Date:

**Optics Final Assessment**



*“For the rest of my life, I will reflect on what light is”*

*- Albert Einstein*

We are starting an amazing new unit on optics, let’s take a look at what’s coming, and the project we’ll be playing with this unit. First, the content:

1. Sources and Properties of Light
   1. Light is emitted in a variety of ways (e.g. electric discharge, incandescence, phosphorescence etc.)
   2. Light can pass right through objects (transparent), pass mostly through objects (translucent) or not pass through at all (opaque)
   3. There’s more to light than meets the eye….literally!
2. Mirrors and Lenses
   1. Light travels in a straight line
   2. Light can be redirected through in a variety of ways (e.g. reflection, refraction) using objects like plane mirrors, curved mirrors, convex lenses or concave lenses
3. Light and Vision
   1. Eyes have many parts that work together with the brain to produce images
   2. We can have vision problems, but we have ways of correcting them using our knowledge of the eye and lenses
   3. Our eyes allow us to see in color
   4. Cameras work just like eyes
   5. Telescopes and microscopes enhance our ability to see

In this unit you will have a chance to explore the topic for yourselves! It’s time to set your inner scientist free to explore optics as you would like to, and to use the knowledge of the topic you’ll accumulate here.

***The Task***

The objective is simple: produce something that demonstrates your understanding of optics.

***How We Can Get There***

Due to the depth and complexity that is required for such a project, you will be working in groups of **two or three**. You are allowed to make your own groups however if you would rather be assigned to a group we can take care of that as well. The important point is that you work in a group that you are comfortable with and can stay on task in order to complete the project with a high level of quality.

***Requirements***

Each completed project will have the following:

1. *A written report titled “background science” discussing the project and how it demonstrates your understanding of optics.* This will be where the majority of your scientific discussion will be. Explain the different ideas of optics you have explored for this project, how they relate to the unit work, and how this best demonstrates your understanding of the topic. The language should be scientific (i.e. technical) in nature, so it should include diagrams, equations, and definitions where appropriate. Please reference all of your sources (we will have Mrs. A from the library come in and explain how to do this at the beginning of next class).
2. *A demonstration or interactive piece.* Throughout the unit we’ll explore the connections between the real world and the theories associated with optics. Now it’s time for you to demonstrate these more directly using a created object or experimental set up. This object should directly relate to your written report and should demonstrate all of the topics you’ve proposed. If there are resources you need that the school may have, let us know and we will try to get ahold of it for you. Keep in mind this would be on a first come, first serve basis, as our resources are limited!

***Possible Topics***

This project is designed to allow you to explore optics in any way you wish. Here are a couple project idea examples that you can use:

1. *Create a game*: You are in charge of redirecting a beam of light from one side of the room to the other, where a light collector is found. However, there are a bunch of different obstacles in the way! Use your knowledge of light to successfully get the beam to teach target (suggested length – 10 levels of increasing difficulty)
2. *“Eye” robot*: You have been commissioned to make a robotic eye for the next Mars rover! Design your robotic eye by discussing what parts you would have to include in it, how conventional technologies could be used to create it, and discussion of any major advancements in technology that would have to be made in order to complete your design.
3. *The Universe’s unseen light*: The Milky Way as we see it at night is a cool looking object, but is that all there really is to it? Using your knowledge of the electromagnetic spectrum, discuss the other possible wavelengths of light and how they look in our galaxy. What kinds of objects do they come from? Are there any odd events that happen to light in space?
4. *Design your own*: There will be many other ideas than the ones listed, so if you are considering a different topic come to us to first get an approval for the project. Some examples may include making a working periscope, binoculars or other device, or researching the story of optics and some of the really cool stories of the scientists who figured it out. To get approved, you will need some justification as to how your project will demonstrate your knowledge of optics.

***Note: All projects must be preapproved before you begin them***

***Assessment***

The completed project should demonstrate at least 2 of the 4 following statements:

1. Demonstrate knowledge of the behavior of waves
2. Explain the properties of visible light
3. Compare visible light to other types of electromagnetic radiation
4. Explain how human vision works

To assess this, each group will present their project in a **mini- science fair** where you will be responsible for the following:

1. Science fair display (with important points from your written report)
2. Your interactive piece (your invention, game or essay)
3. 5 – 10 minute presentation

Details of the science fair display and presentation will be given as a separate handout, however it is exciting to note that Principal B. will be one of the judges in the competition and a prize will be given to the **winner** of the fair! At the end of the fair, your display, interactive piece, and written report will be handed in for further assessment before the final grade is assigned.

In addition, you will perform a **peer evaluation** of your group members and their contributions to the final project. It is important that you are honest with these, as a significant portion of each member’s final grade will be based on this evaluation.

***Reporting Your Final Grade***

The last component of this project is a **self-assessment** of your contributions to the project. We will have a final meeting where you’ll report your assessment, which we will take into consideration when the final grade is established. At this meeting we will discuss any advancements or setbacks you might have had while creating the project, and an open discussion about your other group members and their contributions. These meetings will be 5-10 minutes long, with a time sign up sheet posted on the door. Your final grade will be based on the following breakdown:

20% - Depth of Understanding

20% - Science Fair Display

20% - Oral Presentation

20% - Originality

20% - Self and Peer assessment

By the end of this meeting, we should have a consensus on your final grade for the unit which may or may not be better than you had self-assessed it to be!

Due Date:

**Good Luck!**